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(54)

SCREW COMPRESSOR AND REFRIGERATION SYSTEM HAVING THE SAME

- (57)

Screw compressor comprising: a rotor set (100) comprising a pair of male rotor (110) and female rotor (120) meshing with each other; a rotor housing (200); and a partition plate (300), fixed on the rotor housing and having a first annular section (310) and a second annular section (320) connected to each other, wherein, the diameter of the annular outer surface of the first annular section is the same or substantially the same as the diameter of the circle where tooth tips of male rotor teeth of the male rotor are located, and the diameter of the annular inner surface of the first annular section is the
- same or substantially the same as the diameter of the main shaft of the male rotor; the diameter of the annular outer surface of the second annular section is the same or substantially the same as the diameter of the circle where tooth tips of female rotor teeth of the female rotor are located, and the diameter of the annular inner surface of the second annular section is the same or substantially the same as the diameter of the main shaft of the female rotor.

Refrigeration system configured with such a screw compressor.

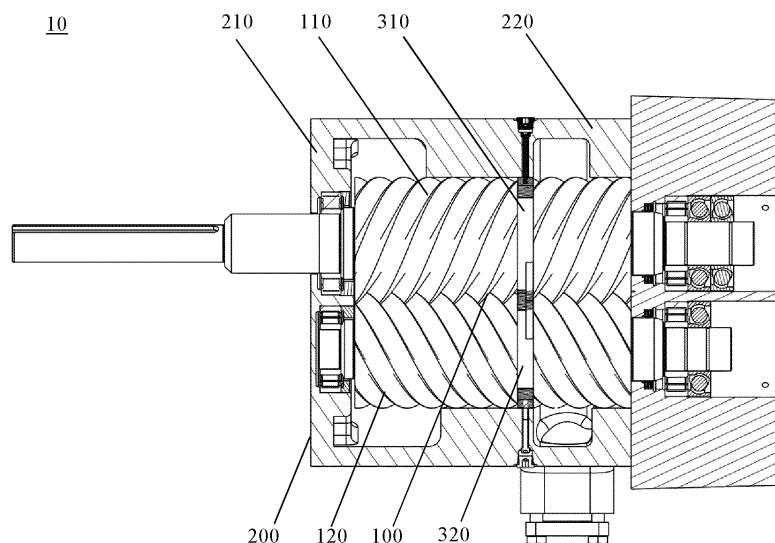


Figure 1

Description**FIELD OF THE INVENTION**

[0001] The present invention relates to the technical field of compressors, in particular to a screw compressor, and further to a refrigeration system configured with the screw compressor.

BACKGROUND OF THE INVENTION

[0002] Screw compressors are common equipment in industrial applications, which generally include single-stage screw compressors, two-stage screw compressors, and three-stage screw compressors etc. Among them, single-stage screw compressor, using a pair of screw-shaped rotors to make rotary movement in the cylinder to compress and transport gas and with a compressor main machine as its core component, is a type of positive displacement compressor. The gas is compressed through the volume change of the tooth space of the mutually meshing male and female rotors installed in parallel inside the rotor housing, causing periodic volume changes in the gas between the tooth space of the rotors, so that the gas is pushed from the suction side to the discharge side along the rotor axis, thus completing the three working processes of suction, compression, and discharge.

[0003] The existing two-stage screw compressors often adopt a two-stage single-machine form under high compression ratio conditions. However, due to the complex structure and numerous components, such compressors are high in cost and inconvenient to install. Therefore, it is necessary to simplify the internal structure of the screw compressors, so to improve reliability, reduce costs, and enhance market competitiveness.

SUMMARY OF THE INVENTION

[0004] In view of the foregoing, the present invention provides a screw compressor, so as to solve or at least alleviate one or more of the aforementioned problems and other problems in the prior art, or to provide alternative technical solutions for the prior art.

[0005] According to a first aspect of the present invention, a screw compressor is provided, comprising:

a rotor set comprising a pair of male rotor and female rotor meshing with each other, where the axis of the main shaft of the male rotor and the axis of the main shaft of the female rotor are parallel to each other, and the male rotor and the female rotor are respectively provided with grooves with the same width in the axial direction that are arranged circumferentially around them in the same radial direction, wherein, the bottom surface of the grooves of the male rotor and the bottom surface of the grooves of the female rotor are the outer circumferential surface of the main

shaft of the male rotor and the outer circumferential surface of the main shaft of the female rotor, respectively;

a rotor housing for accommodating the rotor set; and

a partition plate, fixed on the rotor housing, for dividing the rotor housing into a low-pressure stage housing and a high-pressure stage housing connected to each other, wherein the partition plate has a first annular section and a second annular section connected to each other, where the first annular section and the second annular section are respectively embedded in the groove of the male rotor and that of the female rotor and have the same or substantially the same width in the axial direction as the groove of the male rotor and that of the female rotor, and the first annular section has a free end and a connecting end connected to the second annular section, and the second annular section has a free end and a connecting end connected to the first annular section;

wherein, the diameter of the annular outer surface of the first annular section is the same or substantially the same as the diameter of the circle where the tooth tips of the male rotor teeth of the male rotor are located, and the diameter of the annular inner surface of the first annular section is the same or substantially the same as the diameter of the main shaft of the male rotor; and wherein, the diameter of the annular outer surface of the second annular section is the same or substantially the same as the diameter of the circle where the tooth tips of the female rotor teeth of the female rotor are located, and the diameter of the annular inner surface of the second annular section is the same or substantially the same as the diameter of the main shaft of the female rotor.

[0006] The connecting end of the first annular section and the connecting end of the second annular section may form an intermediate section of the partition plate, where the intermediate section is located between the male rotor and the female rotor.

[0007] The first annular section and the second annular section may be integrally formed.

[0008] The free end of the first annular section may be provided with outlines that are the same or similar to the contour outlines of the male rotor teeth of the male rotor, the free end of the second annular section may be provided with outlines that are the same or similar to the contour outlines of the female rotor teeth of the female rotor, and the intermediate section may be provided with outlines that are the same or similar to the contour outlines of the male rotor teeth of the male rotor and/or the same or similar to the contour outlines of the female rotor teeth of the female rotor.

[0009] The partition plate may further comprise a first annular extension section and a second annular extension

sion section, wherein the first annular extension section is embedded in a groove of the male rotor, with one end thereof connected to the connecting end of the first annular section, and the second annular extension section is embedded in a groove of the female rotor, with one end thereof connected to the connecting end of the second annular section,

wherein, the diameter of the annular outer surface of the first annular extension section is the same as the diameter of the circle where the tooth tips of the male rotor teeth of the male rotor are located, and the diameter of the annular inner surface of the first annular extension section is the same or substantially the same as the diameter of the main shaft of the male rotor; and wherein, the diameter of the annular outer surface of the second annular extension section is the same as the diameter of the circle where the tooth tips of the female rotor teeth of the female rotor are located, and the diameter of the annular inner surface of the second annular extension section is the same or substantially the same as the diameter of the main shaft of the female rotor;

wherein, the end face of the first annular extension section facing the high-pressure stage housing is flush with the end face of the first annular section facing the high-pressure stage housing, and the end face of the second annular extension section facing the high-pressure stage housing is flush with the end face of the second annular section facing the high-pressure stage housing; and wherein, the width of the first annular extension section in the axial direction is the same as the width of the second annular extension section in the axial direction, and is smaller than the width of the first annular section in the axial direction and the width of the second annular section in the axial direction.

[0010] The other end of the first annular extension section may be provided with outlines that are the same or similar to the contour outlines of the male rotor teeth of the male rotor, and the other end of the second annular extension section may be provided with outlines that are the same or similar to the contour outlines of the female rotor teeth of the female rotor.

[0011] The first annular extension section, the second annular extension section, the first annular section, and the second annular section may be integrally formed.

[0012] Seal structures may be respectively provided on the annular inner surface of the first annular section, the annular inner surface of the second annular section, the annular inner surface of the first annular extension section, and the annular inner surface of the second annular extension section.

[0013] The partition plate may be made of metal; and/or the partition plate may be fixed to the rotor housing by bolt connection.

[0014] The low-pressure stage housing and the high-pressure stage housing may be integrally constructed to form the rotor housing.

[0015] The screw compressor may comprise a gas replenishment structure that is arranged at the high-pressure stage housing and connected to a high-pressure stage suction chamber.

[0016] According to a second aspect of the present invention, a refrigeration system is further provided, wherein the refrigeration system is configured with the screw compressor, a condenser, a throttling device, and an evaporator connected into a circuit.

[0017] It can be appreciated that the screw compressor according to the present invention has a simple structure and compact layout. It achieves two-stage compression of the gaseous refrigerant entering the screw compressor merely through a pair of meshing male and female rotors, further improving the compression ratio and thus improving the compression efficiency of the screw compressor. In addition, it can save components, reduce manufacturing costs, and improve installation efficiency.

BRIEF DESCRIPTION OF THE DRAWINGS

[0018] The technical solution of the present invention will be described in further detail below in conjunction with the accompanying drawings and embodiments. However, it should be appreciated that these drawings are only designed for explanatory purposes and are intended to conceptually illustrate the structural configurations described herein, without the need to be drawn proportionally.

FIG. 1 is a cross-sectional view of a screw compressor according to the present invention;

FIG. 2 is a first longitudinal sectional view of the screw compressor shown in FIG. 1;

FIG. 3 is a cross-sectional view of the rotor housing of the screw compressor shown in FIG. 1;

FIG. 4 is a structural schematic diagram of a partition plate of the screw compressor shown in FIG. 1;

FIG. 5 is a structural schematic diagram of a partition plate of the screw compressor shown in FIG. 1;

FIG. 6 is a second longitudinal sectional view of the screw compressor shown in FIG. 1; and

FIG. 7 is a second longitudinal sectional view of the screw compressor shown in FIG. 1 with the rotor set omitted.

DETAILED DESCRIPTION

[0019] The content of the present invention and the

differences between the present invention and the prior art can be understood by referring to the accompanying drawings and the text. The technical solution of the present invention will be described in further detail below through the accompanying drawings and by enumerating some optional embodiments of the present invention.

[0020] It should be noted that any technical features or solutions in the embodiments are one or several of multiple optional technical features or technical solutions. For brevity, it is neither possible to exhaustively enumerate herein all alternative technical features and technical solutions of the present invention, nor is it possible to emphasize that the implementation of each technical feature is one of the optional multiple implementations. Therefore, those skilled in the art should appreciate that any technical means provided by the present invention can be substituted, or any two or more technical means or technical features provided by the present invention can be combined with each other to obtain a new technical solution.

[0021] Any technical feature or technical solution within the embodiments does not limit the scope of protection of the present invention. The scope of protection of the present invention should include any alternative technical solutions that those skilled in the art can think of without creative labor, as well as any new technical solutions obtained by those skilled in the art by combining any two or more technical means or technical features provided by the present invention.

[0022] FIG. 1 schematically illustrates the structure of an embodiment of a screw compressor according to the present invention in general. The screw compressor 10 is composed of a rotor set 100, a rotor housing 200 for accommodating the rotor set 100, a partition plate 300, and other components. The rotor set 100 includes a pair of male rotor 110 and female rotor 120 meshing with each other and having spiral teeth in opposite rotating directions. Specifically, the male rotor 110 is composed of several male rotor teeth that are sequentially connected in the circumferential direction of the main shaft A, and the female rotor 120 is composed of several female rotor teeth that are sequentially connected in the circumferential direction of the main shaft B. Wherein, the gear ratio of the male rotor teeth and the female rotor teeth can be, for example, 5:7 or 6:8. As can be clearly seen from FIGS. 1 and 2, the axis of the main shaft A of the male rotor 110 and the axis of the main shaft B of the female rotor 120 are parallel to each other, and the male rotor 110 and the female rotor 120 are respectively provided with grooves in the same radial direction. Wherein, the grooves of the male rotor 110 and those of the female rotor 120 are arranged circumferentially around the male rotor 110 and the female rotor 120 respectively and have the same width in the axial direction. Wherein, the bottom surface of the grooves of the male rotor 110 and the bottom surface of the grooves of the female rotor 120 are the outer circumference surface of the main shaft A of the male rotor 110 and the outer circumference surface

of the main shaft B of the female rotor 120, respectively.

[0023] It should be emphasized that the partition plate 300 is an important component of the two-stage screw compressor of the present invention, which constitutes the discharge port for low-pressure/first-stage compression and the suction port for high-pressure/second-stage compression. The basic structure of the partition plate and its relative positional relationship, mutual cooperation, and connection relationship with other surrounding components will be described in detail below in conjunction with the appended drawings.

[0024] In the embodiment shown in FIGS. 1 to 4, the partition plate 300 is fixed to the rotor housing 200, for example, by bolt connection, for dividing the rotor housing 200 into a low-pressure stage housing 210 and a high-pressure stage housing 220 that are connected with each other. Wherein, the low-pressure stage housing 210 corresponds to a low-pressure stage rotor pair, and the high-pressure stage housing 220 corresponds to a high-pressure stage rotor pair. The starting end of the low-pressure stage rotor pair, i.e., the first-stage suction port 230, is located on the rotor housing 200, especially on the low-pressure stage housing 210. The tail end of the low-pressure stage rotor pair, i.e., the first-stage discharge port 240, is located on one side of the partition plate 300 facing the low-pressure stage housing 210. The starting end of the high-pressure stage rotor pair, i.e., the second-stage suction port 250, is located on one side of the partition plate 300 facing the high-pressure stage housing 220, and the tail end of the high-pressure stage rotor pair, i.e., the second-stage discharge port 260, is located on the rotor housing 200, especially on the high-pressure stage housing 220.

[0025] With continued reference to FIG. 4, the partition plate 300 can be made of metal, such as high-strength steel, cast iron, or alloy, and includes a first annular section 310 and a second annular section 320 connected to each other. The first annular section 310 and the second annular section 320 are embedded in the grooves of the male rotor 110 and the female rotor 120, respectively. In addition, the width of the first annular section 310 and that of the second annular section 320 in the axial direction is the same or substantially the same as the width of the groove of the male rotor 110 and that of the female rotor 120 in the axial direction. For example, the width of the first annular section 310 and that of the second annular section 320 in the axial direction is slightly smaller than the width of the groove of the male rotor 110 and that of the female rotor 120 in the axial direction. Specifically, due to the relative motion between the rotor set 100 and the partition plate 300, a small gap can be left between the two. In addition, in order to allow the partition plate 300 to move axially during installation, the distance between the partition plate 300 and the end face of the low-pressure stage rotor pair can be adjusted within a certain set distance, which is, for example, generally not greater than 0.1mm, and the distance between the partition plate 300 and the end face of the high-pressure

stage rotor pair is set to about 1mm. Furthermore, the first annular section 310 has a free end 311 and a connecting end 312 connected to the second annular section 320, and the second annular section 320 has a free end 321 and a connecting end 322 connected to the first annular section 310. In order to ensure the mutual flow of refrigerant gas between the low-pressure stage housing 210 and the high-pressure stage housing 220, a first connecting notch is formed circumferentially between the free end 311 and the connecting end 312 of the first annular section 310, and a second connecting notch is formed circumferentially between the free end 321 and the connecting end 322 of the second annular section 320, thereby forming the first-stage discharge port 240 and the second-stage suction port 250. At this point, the area of the first-stage discharge port 240 is the same as the area of the second-stage suction port 250. The range of the central angle of the first annular section 310, i.e., the central angle of the circular arc section between the free end 311 and the connecting end 312, is between X and 360° (excluding the endpoint), where $X=360^\circ - \alpha$, and α is cornerite of the low-pressure section of the male rotor. It should be noted that the cornerite of the low-pressure section of the male rotor is the circumferential angle swept from the suction end face to the discharge end face by the spiral movement of the tooth tip of the male rotor along the tooth space. The range of the central angle of the second annular section 320, i.e., the central angle of the circular arc section between the free end 321 and the connecting end 322, is between Y and 360° (excluding the endpoint), where $Y=360^\circ - \beta$, and β is cornerite of the low-pressure section of the female rotor. It should be noted that the cornerite of the low-pressure section of the female rotor is the circumferential angle swept from the suction end face to the discharge end face by the spiral movement of the tooth tip of the female rotor along the tooth space. It can be seen that the partition plate 300 reduces the radial area of refrigerant gas flow in the radial direction of the rotor set 100 and can effectively achieve second-stage compression.

[0026] In addition, the diameter of the annular outer surface of the first annular section 310 is the same or substantially the same as the diameter of the circle where the tooth tips of the male rotor teeth of the male rotor 110 are located. For example, the diameter of the annular outer surface of the first annular section 310 is slightly larger than the diameter of the circle where the tooth tips of the male rotor teeth of the male rotor 110 are located. Specifically, due to the relative rotation of the male rotor 110 and the rotor housing 200, a small gap can be left between the two, and the annular outer surface of the first annular section 310 can be tightly fixed to the rotor housing 200. The diameter of the annular inner surface of the first annular section 310 is the same or substantially the same as the diameter of the main shaft A of the male rotor 110. For example, the diameter of the annular inner surface of the first annular section 310 is slightly larger than the diameter of the main shaft A of the male rotor

110. Meanwhile, the diameter of the annular outer surface of the second annular section 320 is the same or substantially the same as the diameter of the circle where the tooth tips of the female rotor teeth of the female rotor 120 are located. For example, the diameter of the annular outer surface of the second annular section 320 is slightly larger than the diameter of the circle where the tooth tips of the female rotor teeth of the female rotor 120 are located. Due to the relative rotation between the female rotor 120 and the rotor housing 200, a small gap can be left between the two, and the annular outer surface of the second annular section 320 can be tightly fixed to the rotor housing 200. The diameter of the annular inner surface of the second annular section 320 is the same or substantially the same as the diameter of the main shaft B of the female rotor 120. For example, the diameter of the annular inner surface of the second annular section 320 is slightly larger than the diameter of the main shaft B of the female rotor 120. When installing a screw compressor, the operator can first embed or sleeve the first annular section 310 and the second annular section 320 of the partition plate 300 into the groove of the male rotor 110 and that of the female rotor 120, respectively, and insert the rotor set 100 together with the partition plate 300 into the accommodating chamber of the rotor housing 200, thereby simplifying the installation steps. In this case, the low-pressure stage housing 210 and the high-pressure stage housing 220 can be constructed as one to form the rotor housing 200, as shown in FIGS. 1 and 4. At this point, the annular outer surface of the first annular section 310 and the annular outer surface of the second annular section 320 of the partition plate 300 can be fitted with the inner wall of the rotor housing 200, making the internal space of the rotor housing 200 more compact. This can save unnecessary bolts and bolt holes, reduce installation time, and save material costs.

[0027] In combination with the above embodiments, in other optional embodiments, the connecting end 312 of the first annular section 310 and the connecting end 322 of the second annular section 320 form the intermediate section 330 of the partition plate 300, where the intermediate section 330 is located between the male rotor 110 and the female rotor 120. For the convenience of manufacture, the first annular section 310 and the second annular section 320 can be integrally formed. In addition, in order to improve compression efficiency, the free end 311 of the first annular section 310 can be provided with outlines that are the same or similar to the contour outlines of the male rotor teeth of the male rotor 110, and the free end 321 of the second annular section 320 can be provided with outlines that are the same or similar to the contour outlines of the female rotor teeth of the female rotor 120. In addition, the intermediate section 330 is provided with outlines that are the same or similar to the contour outlines of the male rotor teeth of the male rotor 110, and/or the outlines that are the same or similar to the contour outlines of the female rotor teeth of the female rotor 120.

[0028] In another embodiment of the partition plate of the screw compressor disclosed according to the present invention as shown in FIG. 5, the first annular section 310a, the second annular section 320a, the intermediate section 330a, the free end 311a and the connecting end 312a of the first annular section 310a, the free end 321a and the connecting end 322a of the second annular section 320a, and other parts or components of the partition plate 300a can refer to the aforementioned embodiment of the partition plate 300 as shown in FIG. 4, which will not be repeated here. The partition 300a further comprises a first annular extension section 340a and a second annular extension section 350a. The first annular extension section 340a is embedded in the groove of the male rotor 110, with one end 341a thereof connected to the connecting end 312a of the first annular section 310a. And, the second annular extension section 350a is embedded in the groove of the female rotor 120, with one end 351a thereof connected to the connecting end 322a of the second annular section 320a. The diameter of the annular outer surface of the first annular extension section 340a is the same as the diameter of the circle where the tooth tips of the male rotor teeth of the male rotor 110 are located, and the diameter of the annular inner surface of the first annular extension section 340a is the same or substantially the same as the diameter of the main shaft A of the male rotor 110. In addition, the diameter of the annular outer surface of the second annular extension section 350a is the same as the diameter of the circle where the tooth tips of the female rotor teeth of the female rotor 120 are located, and the diameter of the annular inner surface of the second annular extension section 350a is the same or substantially the same as the diameter of the main shaft B of the female rotor 120.

[0029] On the one hand, the end face of the first annular extension section 340a facing the high-pressure stage housing 220 is configured to be flush with the end face of the first annular section 310a facing the high-pressure stage housing 220, and the end face of the second annular extension section 350a facing the high-pressure stage housing 220 is configured to be flush with the end face of the second annular section 320a facing the high-pressure stage housing 220. On the other hand, the width of the first annular extension section 340a in the axial direction is the same as the width of the second annular extension section 350a in the axial direction, and is smaller than the width of the first annular section 310a in the axial direction and the width of the second annular section 320a in the axial direction, so that the area of the second-stage suction port 250 is smaller than the area of the first-stage discharge port 240, thus further improving the compression ratio of the second stage.

[0030] For the convenience of manufacture, the first annular extension section 340a and the second annular extension section 350a can be designed to be integrally formed with the first annular section 310a and the second annular section 320a. In this case, in order to install the integrally formed partition plate 300a into the groove of

the rotor set 100, the partition plate 300a can be divided into independent two or more sections along the dashed line in FIG. 5 at the intermediate section 330. In addition, in order to improve compression efficiency, the other end 342a of the first annular extension section 340a is provided with outlines that are the same or similar to the contour outlines of the male rotor teeth of the male rotor 110, and the other end 352a of the second annular extension section 350a is provided with outlines that are the same or similar to the contour outlines of the female rotor teeth of the female rotor 120.

[0031] Those skilled in the art can readily contemplate that the annular inner surface of the first annular section 310a, the annular inner surface of the second annular section 320a, the annular inner surface of the first annular extension section 340a, and the annular inner surface of the second annular extension section 350a are respectively provided with seal structures (not shown), such as labyrinth seal structures, or contact or non-contact rotary seal structures such as oil groove seals, sliding ring seals, lip seals, etc., so as to prevent refrigerant gas leakage. In this case, the gap between the inner diameter of the seal structure and the bottom surface of the grooves of the rotor set is designed to be no more than 2mm.

[0032] As an alternative solution, the screw compressor 10 also comprises a gas replenishment structure 400 for introducing refrigerant gas from, for example, an economizer, into the second-stage suction port 250. Specifically, the gas replenishment structure is arranged at the high-pressure stage housing 220, and the gas replenishment structure 400 is connected to the high-pressure stage suction chamber (i.e., the position of the second-stage suction port 250). Referring to FIGS. 1, 3, 6, and 7, the refrigerant gas used for gas replenishment can be first transported to the gas replenishment chamber 420 to be mixed with the discharged gas that has undergone low-pressure/first-stage compression as soon as possible, and the gas pressure is stabilized in the gas replenishment chamber 420 before the refrigerant gas enters the second-stage suction port 250, thereby ensuring the stability of the suction pressure of the high-pressure stage rotor pair so as to further optimize the compression effect of the second-stage compression.

[0033] In addition, the present invention further provides a refrigeration system configured with the aforementioned screw compressor. The refrigeration system comprises a cooling tower, a water chilling unit, and a pumping device, etc. connected through pipelines, wherein the water chilling unit is composed of the aforementioned screw compressor, a condenser, a throttling device, an evaporator, and other components connected into a circuit.

[0034] If terms such as "first" and "second" are used herein to limit components, those skilled in the art should be aware that the use of "first" and "second" is only for the purpose of distinguishing components in terms of depiction. Unless otherwise stated, the above terms do not

have any special meanings.

[0035] Furthermore, as to the terms used to indicate positional relationships or shapes in any of the technical solutions disclosed in the present invention, unless otherwise stated, the implications thereof include states or shapes that are approximate, similar, or close to them. Any component provided by the present invention can be either assembled from multiple individual components or manufactured as a separate component using an integration process.

[0036] If terms such as "center", "longitudinal", "transverse", "front", "back", "left", "right", "vertical", "horizontal", "top", "bottom", "inside", "outside", etc. are used in the depiction of the present invention, the orientations or positional relationships indicated by the above terms are based on the orientations or positional relationships shown in the drawings. These terms are used merely for the convenience of describing the present invention and simplifying the description, rather than indicating or implying that the device, mechanism, component or element referred to must have a specific orientation, be constructed and operated in a specific orientation, so they cannot be understood as forming limitations on the scope of protection of the present invention.

[0037] Last, it should be noted that the above embodiments are only used to illustrate the technical solution of the present invention but not to limit it. Although the present invention has been described in detail with reference to preferred embodiments, those skilled in the art, however, should understand that the specific embodiments of the present invention as described herein are provided by way of example only. The scope of protection is defined by the appended claims.

Claims

1. A screw compressor (10), comprising:

a rotor set (100) comprising a pair of male rotor (110) and female rotor (120) meshing with each other, where axis of a main shaft of the male rotor and axis of a main shaft of the female rotor are parallel to each other, and the male rotor and the female rotor are respectively provided with grooves with the same width in an axial direction that are arranged circumferentially around them in the same radial direction, wherein a bottom surface of grooves of the male rotor and a bottom surface of grooves of the female rotor are an outer circumferential surface of the main shaft of the male rotor and an outer circumferential surface of the main shaft of the female rotor, respectively;
a rotor housing (200) for accommodating the rotor set; and
a partition plate (300), fixed on the rotor housing, for dividing the rotor housing into a low-pressure

stage housing (210) and a high-pressure stage housing (220) connected to each other, wherein the partition plate has a first annular section (310) and a second annular section (320) connected to each other, where the first annular section and the second annular section are respectively embedded in a groove of the male rotor and that of the female rotor and have the same or substantially the same width in the axial direction as the groove of the male rotor and that of the female rotor, and the first annular section has a free end (311) and a connecting end (312) connected to the second annular section, and the second annular section has a free end (321) and a connecting end (322) connected to the first annular section;

wherein, a diameter of an annular outer surface of the first annular section is the same or substantially the same as a diameter of a circle where tooth tips of male rotor teeth of the male rotor are located, and a diameter of an annular inner surface of the first annular section is the same or substantially the same as a diameter of the main shaft of the male rotor; and wherein, a diameter of an annular outer surface of the second annular section is the same or substantially the same as a diameter of a circle where tooth tips of female rotor teeth of the female rotor are located, and a diameter of an annular inner surface of the second annular section is the same or substantially the same as a diameter of the main shaft of the female rotor

2. The screw compressor according to claim 1, wherein the connecting end of the first annular section and the connecting end of the second annular section form an intermediate section of the partition plate, where the intermediate section is located between the male rotor and the female rotor.

3. The screw compressor according to claim 2, wherein the first annular section and the second annular section are integrally formed.

4. The screw compressor according to claim 2 or 3, wherein the free end of the first annular section is provided with outlines that are the same or similar to contour outlines of male rotor teeth of the male rotor, the free end of the second annular section is provided with outlines that are the same or similar to contour outlines of female rotor tooth of the female rotor, and the intermediate section is provided with outlines that are the same or similar to contour outlines of male rotor teeth of the male rotor and/or outlines that are the same or similar to contour outlines of female rotor teeth of the female rotor.

5. The screw compressor according to claim 2 or 3,

wherein the partition plate further comprises a first annular extension section and a second annular extension section, where the first annular extension section is embedded in a groove of the male rotor, with one end thereof connected to the connecting end of the first annular section, and the second annular extension section is embedded in a groove of the female rotor, with one end thereof connected to the connecting end of the second annular section,

wherein, a diameter of an annular outer surface of the first annular extension section is the same as a diameter of a circle where tooth tips of male rotor teeth of the male rotor are located, and a diameter of an annular inner surface of the first annular extension section is the same or substantially the same as the diameter of the main shaft of the male rotor; and wherein, a diameter of an annular outer surface of the second annular extension section is the same as a diameter of a circle where tooth tips of female rotor teeth of the female rotor are located, and a diameter of an annular inner surface of the second annular extension section is the same or substantially the same as the diameter of the main shaft of the female rotor;

wherein, an end face of the first annular extension section facing the high-pressure stage housing is flush with an end face of the first annular section facing the high-pressure stage housing, and an end face of the second annular extension section facing the high-pressure stage housing is flush with an end face of the second annular section facing the high-pressure stage housing; and wherein, a width of the first annular extension section in the axial direction is the same as a width of the second annular extension section in the axial direction, and is smaller than a width of the first annular section in the axial direction and a width of the second annular section in the axial direction.

6. The screw compressor according to claim 5, wherein the other end of the first annular extension section is provided with outlines that are the same or similar to contour outlines of male rotor teeth of the male rotor, and the other end of the second annular extension section is provided with outlines that are the same or similar to contour outline of female rotor teeth of the female rotor.
7. The screw compressor according to claim 5, wherein the first annular extension section, the second annular extension section, the first annular section, and the second annular section are integrally formed.
8. The screw compressor according to claim 5, wherein seal structures are respectively provided on the an-

annular inner surface of the first annular section, the annular inner surface of the second annular section, the annular inner surface of the first annular extension section, and the annular inner surface of the second annular extension section.

9. The screw compressor according to any of claims 1-3, wherein the partition plate is made of metal; and/or the partition plate is fixed to the rotor housing by bolt connection.
10. The screw compressor according to any of claims 1-3, wherein the low-pressure stage housing and the high-pressure stage housing are integrally constructed to form the rotor housing.
11. The screw compressor according to any of claims 1-3, wherein the screw compressor comprises a gas replenishment structure (400) that is arranged at the high-pressure stage housing and connected to a high-pressure stage suction chamber.
12. A refrigeration system, wherein the refrigeration system is configured with the screw compressor according to any of claims 1-11, a condenser, a throttling device, and an evaporator connected into a circuit.

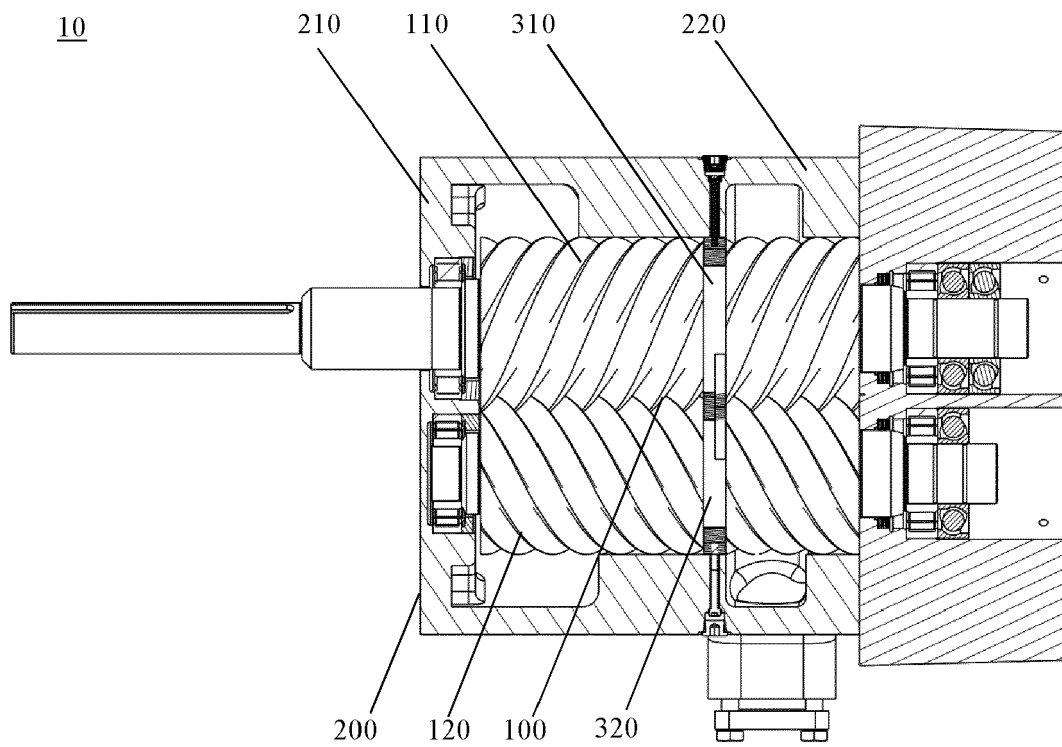


Figure 1

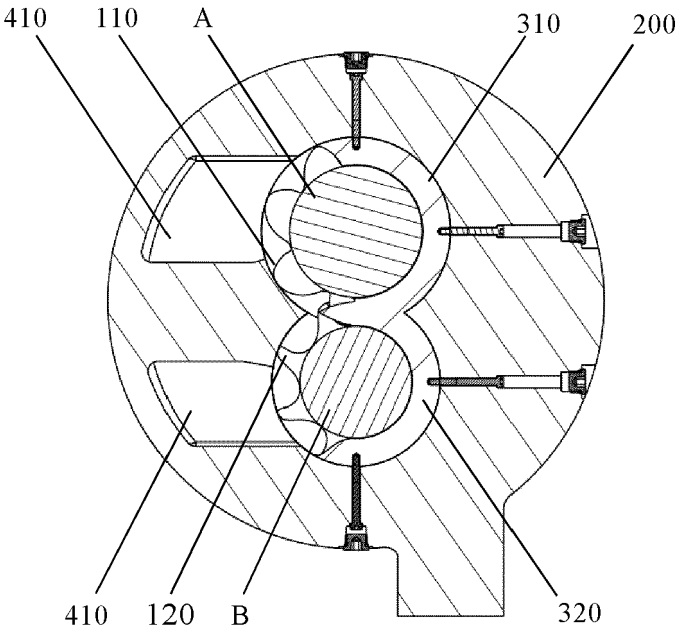


Figure 2

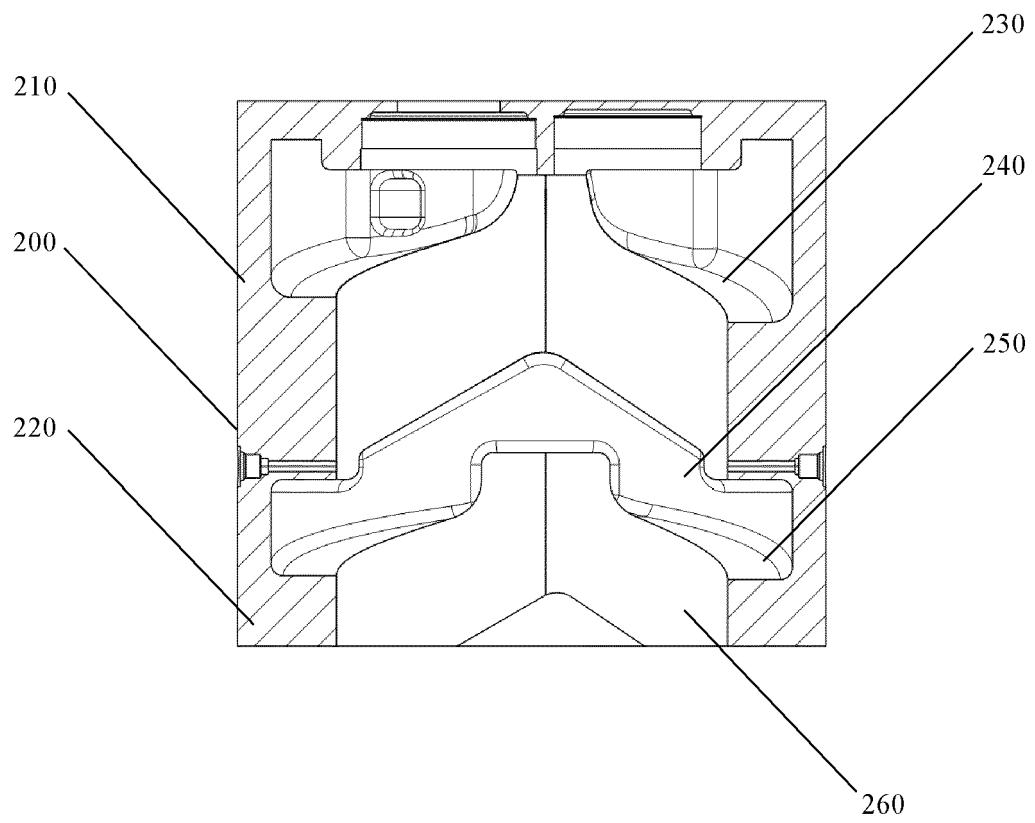


Figure 3

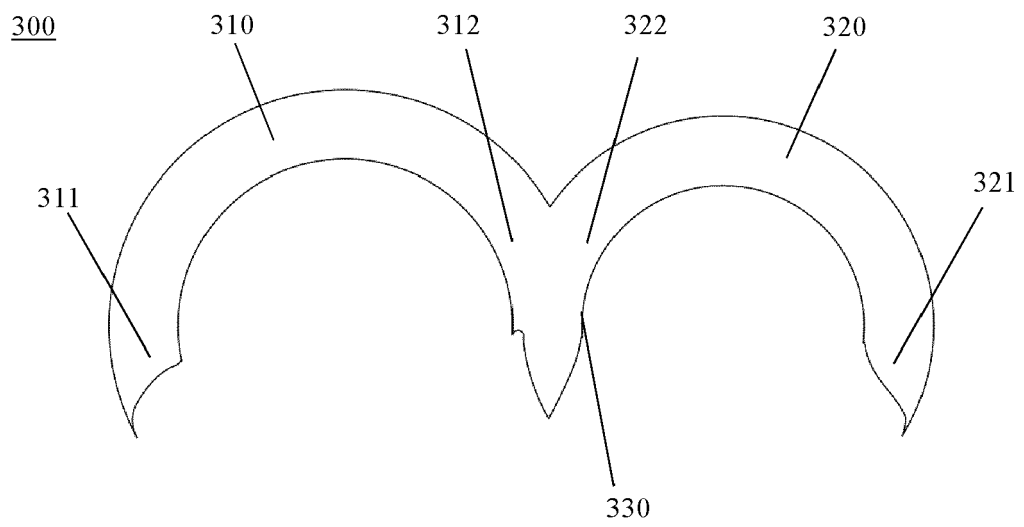


Figure 4

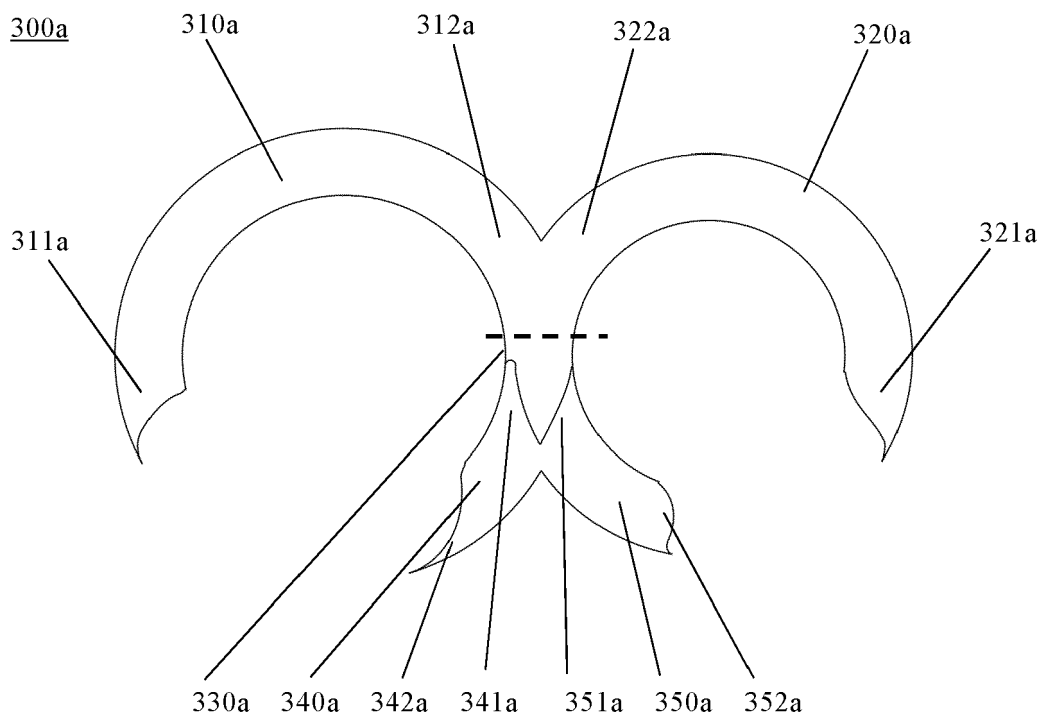


Figure 5

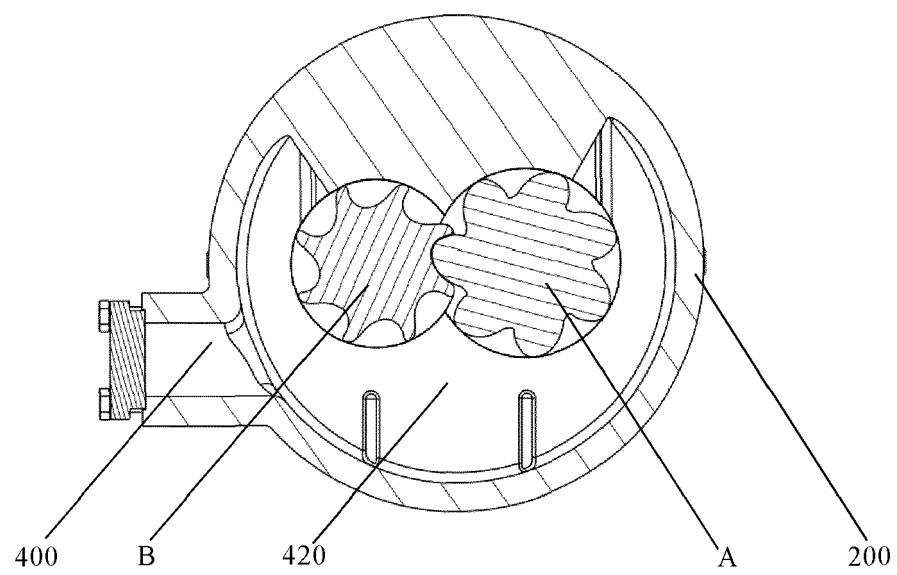


Figure 6

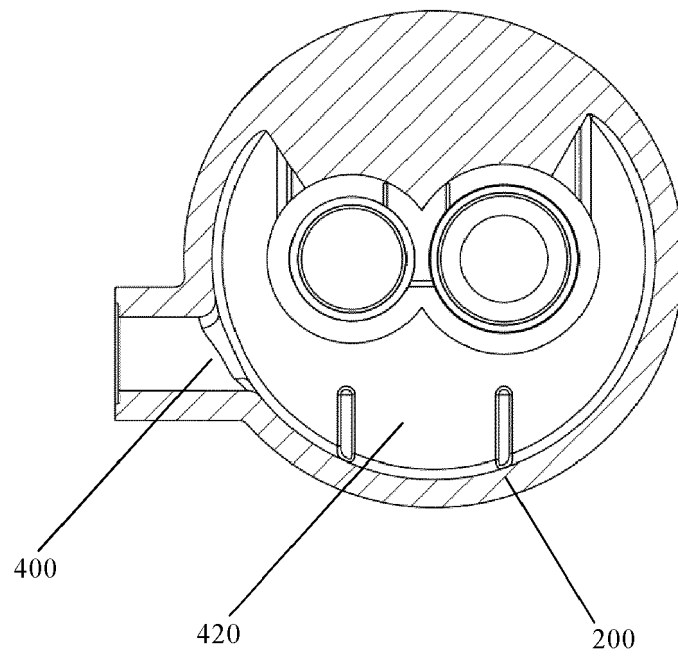


Figure 7



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			F04C
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Place of search Munich		Date of completion of the search 12 July 2024	Examiner Descoubes, Pierre
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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